

Patent claims

1. Method for controlling the phase of successively transmitted frames, in which data symbols are transmitted at a constant symbol frequency, in which method a phase difference between the clock of the frame transmission and a data clock is determined and dependent on the phase difference an adjusting signal is produced for controlling the injection of stuffing data symbols into the frames for changing the frame length and the phase of the frame transmission, whereby the phase of the frame transmission is controlled so that the frames are transmitted on average synchronously with the data clock, wherein the adjusting signal is produced dependent on the phase difference determined from N frames in each case successively transmitted, whereby N is at least equal to 2.

2. Method according to claim 1, wherein the controlling, according to which the adjusting signal is produced, has a proportional section and an integral section.

3. Method according to claim 1, wherein the controlling of the adjusting signal has a large limit cycle.

4. Method according to claim 1, wherein the controlling of the adjusting signal is set up in such a manner that it has a large limit cycle and a small limit cycle, the adjusting signal movement of which has a higher frequency than the adjusting signal movement of the large limit cycle and during which stuffing data symbols are injected in two alternating amounts into the frames.

5. Method according to claim 1, wherein the adjusting signal can assume several different conditions, whereby the

different conditions designate different amounts of injected stuffing data symbols.

6. Method according to claim 1, wherein the adjusting signal is produced dependent on the phase difference averaged in each case over N frames successively transmitted.

7. Method according to claim 1, wherein the controlling of the adjusting signal is time- and amplitude-discrete.

8. Method according to claim 1, wherein for determining the phase of the transmitted frames and the data clock or for determining the phase difference thereof it is recorded in which periods of a signal with a phase measurement frequency an edge of the data clock or the beginning of a new frame arises.

9. Method according to claim 8, wherein the phase measurement frequency is an integral multiple of the symbol frequency.

10. Method according to claim 1, wherein N is equal to 2.

11. Phase detector for use in a device for controlling the phase of successively transmitted frames, in which data symbols are transmitted at a constant symbol frequency, whereby the phase detector is set up in such a manner that it determines a phase difference between the clock of the frame transmission and a data clock and produces an output signal, whereby the phase detector is set up in such a way that it produces the output signal dependent on the phase difference determined from N frames in each case successively transmitted, whereby N is at least equal to 2, and

whereby the controlling device is set up in such a manner that dependent on the output signal of the phase detector an adjusting signal is produced for controlling the injection of stuffing data symbols into the frames for changing the frame length and the phase of the frame transmission and controls the phase of the frame transmission so that the frames on average are transmitted synchronously with the data clock.

- 10 12. Device for controlling the phase of successively transmitted frames in which data symbols are transmitted at a constant symbol frequency, with a phase detector for determining a phase difference between the clock of the frame transmission and a data clock and an adjusting signal
15 generating device, which is connected to the phase detector and set up in such a way that dependent on the phase difference it produces an adjusting signal for controlling the injection of stuffing data symbols into the frames for changing the frame length and the phase of the frame
20 transmission, whereby the device is set up in such a manner that it controls the phase of the frame transmission so that the frames on average are transmitted synchronously with the data clock, and
whereby the device is set up in such a manner that it
25 produces the adjusting signal dependent on the phase difference determined from N frames in each case successively transmitted, whereby N is at least equal to 2.

13. Device according to claim 12,
30 wherein the adjusting signal generating device has a controller block with a proportional section and an integral section.

14. Device according to claim 12,

wherein the adjusting signal generating device has a threshold switch, which is set up in such a manner that it supervises an input signal received by it in relation to over or under-stepping at least one limit value and
5 dependent on this produces the adjusting signal.

15. Device according to claim 12, wherein the device is integrated in a semiconductor module.

10 16. Device according to claim 12, wherein the signals are processed digitally in the device.

17. Device according to claim 12, wherein the signals are processed in the device by execution of a program in a
15 microprocessor.